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DESCRIPTIONS OF THE OLDEST KNOWN SOUTH AMERICAN MAMMALS, FROM THE RÍO CHICO FORMATION[1]

BY GEORGE GAYLORD SIMPSON

The remarkably full sequence of mammalian faunas of South America has hitherto begun with the *Notostylops* Fauna of the Casamayor Formation of Patagonia. The only reported supposed older mammals were a few isolated specimens, now lost and probably not mammalian, and a single identifiable specimen which, with a few scraps, constituted the "*Proteodidelphys* Fauna" and which proves to be of highly dubious origin and not separable from a species of relatively late (Santa Cruz, probably lowest Miocene) age (see Simpson 1932*a*). Within the last five years, however, it has been discovered that there is a mammalian fauna immediately below the Casamayor and distinct from its *Notostylops* Fauna. This very important discovery has been announced briefly by Piatnitzky (1931), by Feruglio (1931, based on discoveries by Piatnitzky and by Brandmayr), and by me (1932*b*, 1933). None of these oldest mammals has been described or named, aside from the passing remarks that "the mammals are very definitely of Tertiary aspect and close to those of the *Notostylops* beds" (Simpson, 1932*b*, pp. 7–8) and that the formation contains "a fauna or faunal facies of mammals of Tertiary type, principally notoungulates, of very primitive character and small individual size" (Simpson 1933, p. 11). It has now been possible to study most of the known specimens, and they are named and described and their occurrence briefly discussed in the present paper.

Throughout most of Chubut, the Casamayor tuffs and bentonites are underlain by a series of sandstones and clays (mostly bentonites or bentonitic) of very different aspect, previously considered as of Cretaceous age and barren or dinosaur-bearing[2]. As regards the supposed occurrence of dinosaurs here, these are all extremely dubious and it can be affirmed that no dinosaur has ever been found in the middle or upper part of this probably complex series and probably none, in place of original deposit, even in the lower part (Feruglio 1931, p. 21; Simpson 1933*b*, pp. 4–6). Various names have been applied to this formation.

[1]Publications of the Scarritt Expeditions, No. 24.

[2]In some places the so-called "argiles fissilaires" intervene, but these need not be discussed here.

It is, approximately, Ameghino's "Notostylopense basal," Windhausen's "parte superior de los estratos con dinosaurios," Feruglio's "Pehuenche," Frenguelli's "Sehuenense," etc. I have elsewhere (1933) shown that none of these names can properly be used. "Notostylopense basal," besides the fact that it is not a stratigraphic name (and is also etymologically erroneous) rested wholly on theory—there was no evidence that the beds had anything to do with the "Notostylopense" = Casamayor. It was, in fact, a remarkably shrewd guess, much nearer the truth than most of the work of Ameghino's critical successors, but it was not a correct scientific interpretation of the stratigraphy. The variations on the idea "Upper part of dinosaur beds" not only provide no useful and correct stratigraphic terminology, but are fundamentally wrong in application to beds which do *not* contain dinosaurs. Both Pehuenche and Sehuenense are useful terms, but not in application to this series, as they imply correlations that are probably or surely incorrect. In view of these nomenclatural inadequacies and of the lithologic and faunal peculiarity of the formation in question, I have (1933) named this formation the Río Chico. The mammal-bearing formations previous to the Patagonian marine so far surely distinguished are as follows:

Colhué-Huapí and Trelew (*Colpodon* fauna)
Deseado (*Pyrotherium* fauna)
Musters (*Astraponotus* fauna)
Casamayor (*Notostylops* fauna)
Río Chico (*Kibenikhoria* fauna)

The first four are familiar and were described by Ameghino. The last, still scanty but adequately distinctive, is described here.

It is not impossible that a few of Ameghino's "Notostylopense" specimens were from the Río Chico Formation, but this could now be established only by a process of elimination. If any of his species are found to occur in the Río Chico but are not again found in the Casamayor, presumably they were from the lower beds. At present this has not been found true of any species. A few of the Ameghino specimens are labeled as from sandstones, "areniscas," but as this term was sometimes also applied to the coarser tuffs, the true quartz sandstones are not necessarily indicated. Carlos Ameghino stated to me in 1931 that he did not recall ever finding a fossil in place in the beds now called Río Chico. Ameghino's "Notostylopense inferior" is part of the Casamayor and is not equivalent to or included in the Río Chico.

Roth's *Lelfunia haugi* and *Monolophodon minutus*, hitherto ignored or considered as of Casamayor age, were from beds probably of Río

Chico age. As far as can be definitely established, these are the only Río Chico mammals hitherto described.

The known Río Chico fossils have been collected by Roth, Piatnitzky, Feruglio, Brandmayr, Bordas, and the Scarritt Expeditions. The Scarritt Expeditions (1930–1931 and 1933–1934) material is the chief basis of this paper. The few Roth specimens have also been studied, for which privilege I am much indebted to Dr. Angel Cabrera and to Dr. L. M. Torres, former Director of the Museo de La Plata. Dr. Egidio Feruglio very kindly sent his large and important collection to New York for study, and I am very appreciative of his liberality in permitting its inclusion in this study. Ing. A. Piatnitzky gave us much assistance in the field, and first indicated to us the important Cañadón Hondo locality. Ing. J. Brandmayr accompanied me to the Bajo de la Palangana and also gave stratigraphic data on that area. I also wish to thank Sr. Carlos Ameghino for unpublished data on the magnificent Casamayor collection made by him, Dr. M. Doello Jurado for the privilege of studying the Ameghino Collection, now in his charge, and Sr. A. F. Bordas for assistance in this connection. Without the detailed knowledge of the Casamayor fauna made possible by this coöperation, the true character of the Río Chico material could not be established.

The accompanying drawings are by Mildred Clemens.

The present paper is confined to the description of specimens, but will be immediately followed by another in which data as to stratigraphy and localities are given and the general nature and correlation of the fauna discussed.

Although catalogue numbers have not yet been assigned to them, the specimens from the Feruglio Collection here described have been presented to the University of Padua, Italy, where they will be permanently preserved.[1] Casts of all these specimens are in the American Museum, and for the exact specification of types the catalogue numbers of these casts are given.

MARSUPIALIA

BORHYAENIDAE

PATENE,[2] new genus

TYPE.—*Patene coluapiensis*, new species.

DISTRIBUTION.—Río Chico and Casamayor Formations, Patagonia.

DIAGNOSIS.—Borhyaenids of medium to small size, with upper molars of very primitive type. Paracone present on M^{1-3} only slightly smaller than and well separated from metacone. Paracone and metacone nearly external on M^{1-2}, nearly

[1] The description of, and still more the founding of species on, specimens privately owned should, I think, be universally condemned.

[2] *Patene* "fox," Tehuelche. With few exceptions I have compounded the names of the oldest South American mammals from the oldest language of the area in which they occur.

median on M^3. Increasingly great metastylar spur on M^{1-3}, on M^3 projecting strongly posteriorly. Distinct style external to and separate from paracone on M^{1-2}. Protocone large on all molars. M^{1-3} with small, distinct proto- and metaconules. M^4 as wide as M^3, with strong parastylar spur, paracone median, metacone represented by a basal cuspule, tooth still distinctly molariform.

Patene coluapiensis,[1] new species

TYPE.—Amer. Mus. No. 28448, part of right maxilla with M^{1-4}. Found by C. S. Williams.

HORIZON AND LOCALITY.—Lowest fossil horizon, Casamayor Formation, barranca south of Lago Colhué-Huapí, Chubut, Argentina.

DIAGNOSIS.—Only known definable species of genus. Length M^{1-4}, 24.5 mm.

Although not from the Río Chico, this interesting genus and species are here published in order to list *Patene* in the Río Chico fauna without publishing a *nomen nudum.* A full description, with illustrations, has been prepared and will be published later. *Patene* is one of the most primitive, and is the oldest, of known borhyaenid genera. In the Río Chico it is represented at present only by a single broken upper molar, Amer. Mus. No. 28532, from Cañadón Hondo. This differs somewhat from *P. coluapiensis,* but so slightly as to warrant the tentative conclusion that it belongs to the same genus. The specimen is inadequate to define a species.

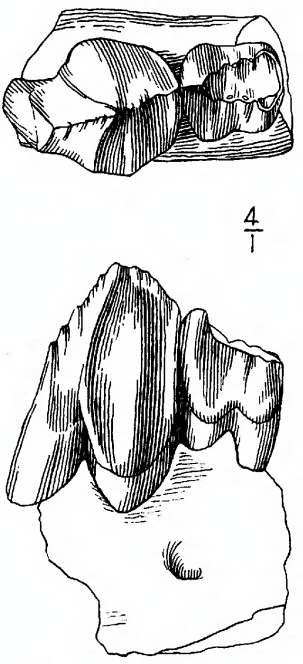

Fig. 1. *Polydolops winecage,* new species. Type, Feruglio Collection. Left lower jaw with M_{1-2}. Crown and external views, enlarged four diameters.

POLYDOLOPIDAE

Polydolops winecage,[2] new species

TYPE.—In Feruglio Collection, part of left lower jaw with M_1 and M_2. Cast, Amer. Mus. No. 27893.

HORIZON AND LOCALITY.—About six meters below the lowest true ash bed of the Casamayor, Bajo de la Palangana, Chubut, Argentina.[3]

DIAGNOSIS.—M_1 length 4.5 mm., width 4.0 mm. M_2 length 3.2 mm., width 2.8 mm. General structure close to *P. thomasi,* but M_1 considerably wider relative to its length, and M_2 much smaller both absolutely and relative to M_1.

P. crassus has M_1 even wider relative to its length and M_2 is much larger, *P. serra* has

[1] *Coluapi,* an abbreviated form and the usual pronunciation of the Araucanian name *Colü-uapi,* now usually written Colhué-Huapí.

[2] *Winecage,* "eight," Tehuelche. This is the eighth species to be referred to this genus.

[3] For more detailed horizon and locality data of this and all other specimens described in this paper see the next paper of this series.

a smaller and more slender M_1 and a larger M_2, and *P. clavulus* is smaller.

?Polydolops kamektsen,[1] new species

TYPE.—Amer. Mus. No. 28525. Part of right lower jaw with M_3.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—M_3 very small, length 2.4 mm. and width 2.0 mm. in type, rounded oval in contour, trigonid narrower than talonid.

This is intermediate between *P. clavulus* and *P. serra* in size, and not close enough to either to be possibly synonymous. It is morphologically so distinctive that it probably belongs to a new genus, but the specimen is inadequate for definitive decision on this point. M_2 (as indicated by alveoli) was considerably smaller than in *P. winecage.*

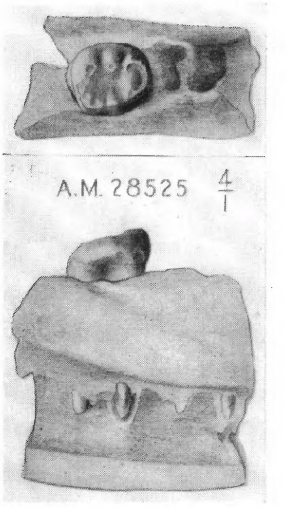

Fig. 2. *?Polydolops kamektsen,* new species. Type, Amer. Mus. No. 28525. Part of right lower jaw with M_3. Crown and external views, enlarged four diameters.

SEUMADIA,[2] new genus

TYPE.—*Seumadia yapa*, new species.

DIAGNOSIS.—M^4 triangular, slightly wider than long, the corners somewhat elevated but without any distinct cusps. Crown very low, with a very shallow basin, with numerous irregular, anastomosing small grooves and ridges.

The proportions and the cusp structure, or its absence, sharply distinguish this from the homologous tooth of *Polydolops*. The proportions may have been more nearly similar in *Pliodolops*, in which M^4 is not yet known, but M^3 of that genus has strong, definite cusps and could hardly have been associated with an M^4 like that of *Seumadia. Amphidolops* has similarly wrinkled enamel and small cusps, but the cusps (also in the upper teeth, as suggested by an M^2 probably of this genus, in our collection), while small, are numerous, sharp, and distinct, and the crowns are rather high although the apical pattern is shallow. No other genus suggests comparison.

The genus is surely distinct, and is named even though the material is so limited, because of the great interest in this form which belongs to the oldest South American faunule.

[1] *Kamektsen* (also sometimes written *Kamekctsen, Kamek czen,* and *humanakoutsen*), "nine," Tehuelche. This is the ninth species to be referred to this genus.

[2] *Seu(nc)*, "many," *mad*, "valley," Tehuelche, in allusion to the innumerable anastomosing grooves on the crown.

Fig. 3. *Seumadia yapa*, new genus and species. Type, Amer. Mus. No. 28431. Isolated M^4. Crown view, enlarged four diameters.

Seumadia yapa,[1] new species

TYPE.—Amer. Mus. No. 28431, isolated M^4.

HORIZON AND LOCALITY.—Río Chico Formation, 37 meters above the "Banco Verde" of the Salamanca, Cerro Redondo, west of Puerto Visser, Chubut, Argentina.

DIAGNOSIS.—Sole known species of the genus. M^4 measures 3.4 mm. in length and 3.6 mm. in width.

FAMILY UNCERTAIN

GASHTERNIA,[2] new genus

TYPE.—*Gashternia ctalehor*, new species.

DISTRIBUTION.—As for the sole species.

DIAGNOSIS.—Metaconid higher than and directly internal to protoconid. Paraconid conical, anteroexternal to metaconid, smaller than metaconid and basally confluent with it. Anterior wing of protoconid crescent, at least on M_2?, running to anterior border at its median point and not to the paraconid. Talonid about equal in size to trigonid and hypoconid about as high as protoconid. Entoconid posterointernal, somewhat elongate anteroposteriorly. Apparently no hypoconulid.

The type jaw has two teeth which appear to be M_{1-2} but could be P_4–M_1. The more anterior tooth is slightly broken, but on it the paraconid was apparently larger, nearer the protoconid and farther from the metaconid, and the peculiar anterior protoconid wing was less developed or absent.

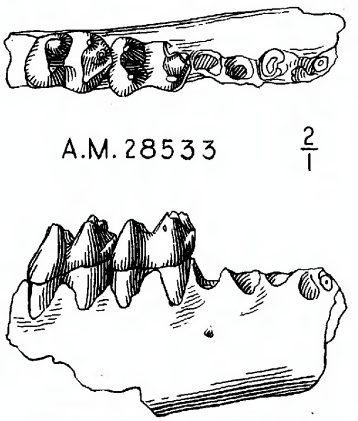

Fig. 4. *Gashternia ctalehor*, new genus and species. Type, Amer. Mus. No. 28533. Right lower jaw with two teeth. Crown and external views, enlarged two diameters.

Alveoli indicate that there was a large, semi-procumbent canine, followed by a very small, one-rooted, crowded P_1, a larger two-rooted P_2, closely crowded and planted obliquely so that its anterior root is posteroexternal to that of P_1, and a still larger two-rooted P_3.

This peculiar little jaw is quite unlike anything else known to me. It clearly is not a notoungulate, and while it could conceivably be a condylarth or litoptern-like animal, it is too unlike any other known to warrant such a theory of relationships. There is some suggestion that it may be marsupial, chiefly the fact that the probabilities somewhat favor the presence of only three premolars, but this is not certain.

[1] *Yapa*, "little," Tehuelche.
[2] *Gashtern*, "deep," Tehuelche = *Hondo* in Spanish, from the locality.

The molars are as much like those of some marsupials as like any other group, although not enough to prove relationships. *Caroloameghinia* is remotely similar, but very different in detail, with separate entoconid and hypoconulid, distinct metastylid, etc. Comparison with any caenolestoids is excluded not only by the somewhat different molar structure, but also by the character of the premolar roots and the large canine.

Gashternia ctalehor,[1] new species

TYPE.—Amer. Mus. No. 28533. Part of right lower jaw with two cheek teeth and several alveoli.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—Sole known species of genus. First tooth of type, length 4.9 mm. width 3.2 mm., second tooth, length 5.0 mm., width 3.5 mm.

CONDYLARTHRA

DIDOLODONTIDAE

Ernestokokenia yirunhor[2]

TYPE.—Amer. Mus. No. 28539, part of right lower jaw with M_{2-3}.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—A didolodontid with very simple teeth, smaller than any species previously referred to *Ernestokokenia* and larger than any known species of *Asmithwoodwardia*. M_2, length 6.2 mm., width 4.8 mm.; M_3, length 6.9 mm., width 4.7 mm.

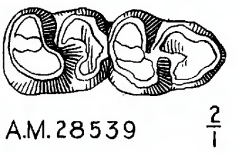

Fig. 5

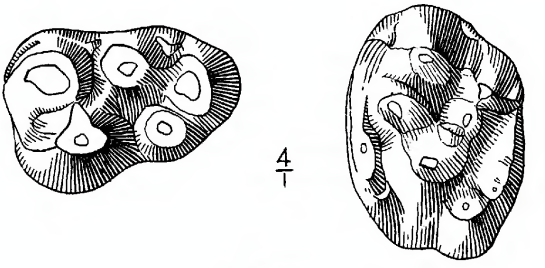

Fig. 6

Fig. 5. *Ernestokokenia yirunhor*, new species. Type, Amer. Mus. No. 28539. Right M_{2-3}. Crown view, enlarged two diameters.

Fig. 6. *Ernestokokenia ?yirunhor*. Doubtfully referred specimen in Feruglio Collection. Right M_3 and left M^3. Crown views, enlarged four diameters.

Ameghino's genera *Asmithwoodwardia*, *Ernestokokenia* (including the upper teeth named *Notoprotogonia*), and *Archaeohyracotherium* are separated by only the most trivial structural details and can be retained

[1] *Ctale(nc)*, "small," *hor*, "tooth," Tehuelche.
[2] *Yirun*, "hill," *hor*, "tooth," Tehuelche, from the very bunodont teeth.

as separable at all only because the type species are distinct and the genera may prove to be so when more than isolated teeth are known. Incomplete as it is, this specimen is the best of this group yet found. Its generic assignation is, of course, unclear since it is also a very distinct species and the supposed generic differences are so minor and variable, but on the whole it seems most satisfactory to place it in *Ernestokokenia*.

In the Feruglio Collection from the upper sandstone of the Bajo de la Palangana there is an M_3, measuring 6.6 by 4.7 mm., which is probably of this species. In the same lot is an M^3 also possibly of this species. Except for characters clearly due to its being a last molar, this tooth is closely similar to those of other species of *Ernestokokenia* ("*Notoprotogonia*"), but indicates a smaller animal, length 5.4 mm., width 6.7 mm. (Casts, Amer. Mus. No. 27896.)

Ernestokokenia chaishoer,[1] new species

TYPE.—In Feruglio Collection, isolated upper molar, probably M^2. Cast, Amer. Mus. No. 27892*a*.

PARATYPE.—In Feruglio Collection, isolated lower molar, probably M_2. Cast, Amer. Mus. No. 27892*b*.

HORIZON AND LOCALITY.—About six meters below lowest true tuff of the Casamayor, Bajo de la Palangana, Chubut, Argentina.

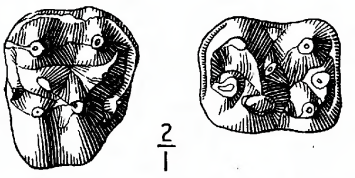

Fig. 7. *Ernestokokenia chaishoer*, new species. Type and paratype, in Ferugilo Collection. Right ?M^2 and right ?M_2. Crown views, enlarged two diameters.

DIAGNOSIS.—$M^{?2}$ longer relative to width than known teeth of *E. patagonica* or *E. trigonalis* and somewhat larger. No cingulum across protocone or hypocone, but continuous, sharp external cingulum. Much larger than *Archaeohyracotherium mediale*. M_2 larger than *E. nitida* and with small cusp on hypoconid-metaconid crest, as in *Didolodus*, trigonid and talonid of equal width. $M^{?2}$ length 7.9, width 9.4 mm. $M_{?2}$ length 8.2, width 6.4 mm.

The lower molar is with difficulty distinguishable from an as yet unnamed Lower Casamayor species of *Didolodus*, but the upper molar, having no mesostyle, obviously is not of *Didolodus*. As the two teeth are from the same horizon and locality, are harmonious in structure, and occlude well, it is proper to assume that they are of the same species. As already suggested, the generic division of this group is as yet very unsatisfactory. It is also unlikely that this robust species is really of the same genus as the diminutive teeth from the same locality referred to *E. yirunhor* (above), but the material

[1] *Chaish*, "large," *oer* (or *hor*), "tooth," Tehuelche. (Musters gives *chaish* and *oer;* Schmid, *ctsainic* and *hor*).

is inadequate for generic revision and it seems most conservative to retain these similar forms in *Ernestokokenia* for the present.

LITOPTERNA

?PROTEROTHERIIDAE

WAINKA,[1] new genus

TYPE.—*Wainka tshotshe*, new species.

DISTRIBUTION.—As for the species.

DIAGNOSIS.—Upper molar resembling *Ricardolydekkeria* in general structure, but paracone and metacone heavy, very close together, bases connate, and no trace of a mesostyle.

The tooth is heavier and more transverse than the type of *Ricardolydekkeria praerupta*, with the conules more distinct, somewhat more as in *Josepholeidya*, the metaconule somewhat larger and better separated from the protocone. The protostyle, or anterointernal cingulum cusp, is well developed and about as in *Ricardolydekkeria*, and the hypocone, or posterointernal cingulum cusp, is considerably smaller. The parastyle is strongly developed, also much as in *Ricardolydekkeria*, but there is a sharp, well-marked, continuous external cingulum and no trace of mesostyle or median external fold.

Although known only from one tooth, the genus is very distinctive and merits a name as one of the two oldest known South American mammals. Many isolated teeth of this general type are known from later beds, but all have strong mesostyles[2] and other, less-marked distinctions. The affinities of *Wainka* are apparently with this group, *Josepholeidya*, *Ricardolydekkeria*, etc., very tentatively placed in the Proterotheriidae pending discovery of associated material which may determine the affinities more closely.

Wainka tshotshe[3]

TYPE.—Amer. Mus. No. 28505, isolated left upper molar (M^1 or M^2).

HORIZON AND LOCALITY.—Río Chico Formation, 37 meters above the "Banco Verde" of the Salamanca, on Cerro Redondo west of Puerto Visser, Chubut, Argentina.

DIAGNOSIS.—Sole known species of genus. Length of type 8.9 mm., width 12.8 mm.

A lower tooth, left M_3, from the same horizon and locality, Amer. Mus. No. 29101, may represent this genus and perhaps also this species. Its size and structure are compatible with *Wainka tshotshe*, and it re-

[1] *Wainc* or *Waink*, Tehuelche, "old."

[2] Ameghino's figures of *Josepholeidya adunca* give the impression that the mesostyle is weak or absent, but it is broken on the specimen and was strong when undamaged.

[3] *Choche* or *tshotshe*, Tehuelche, "one."

sembles *Anisolambda* (which I believe to be the lower dentition of *Josepholeidya*, *Ricardolydekkeria*, or both) to about the same degree as *Wainka* resembles *Ricardolydekkeria*. The tooth measures 14.6 mm. by approximately 8 mm. (slightly broken). The general structure is as in *Anisolambda*, but the paraconid is slightly more external and is almost completely conical, being connected neither to the metaconid nor to the anterior crest from the protoconid. The latter crest does not curve as directly inward as in *Anisolambda*, but runs more forward and then turns internally at nearly a right angle. The hypoconulid projects very strongly, much more than in any species of *Anisolambda* and there is a

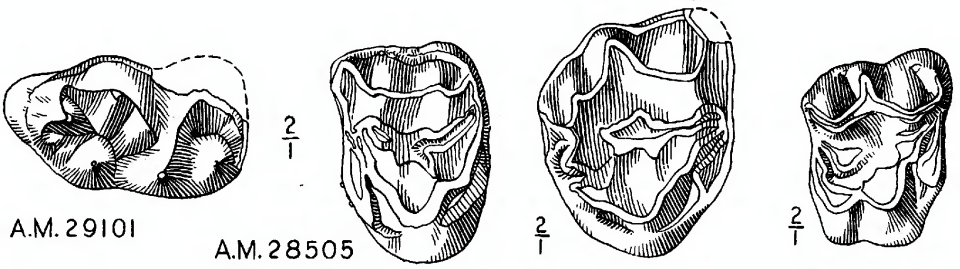

Fig. 8 Fig. 9 Fig. 10

Fig. 8. *Wainka tshotshe*, new genus and species. Type, Amer. Mus. No. 85205, and referred specimen, Amer. Mus. No. 29101. Left upper molar and left M_3. Crown views, enlarged two diameters.

Fig. 9. ?*Victorlemoinea* species. Feruglio Collection. Right M^3. Crown view, enlarged two diameters.

Fig. 10. *Josephleidya* species. Feruglio Collection. Right upper molar. Crown view, enlarged two diameters.

shelf, with sharp, denticulate rim, between and internal to it and the isolated, conical entoconid. The talonid, at least (broken off on the trigonid), has a sharp, continuous, but narrow external cingulum.

VICTORLEMOINEIA sp.

An M^3 in the Feruglio Collection from the upper sandstone in the Bajo de la Palangana apparently represents this genus, and is about the size of *V. emarginata*, but M^3 of the latter species is not known and no exact comparison can be made. (Cast, Amer. Mus. No. 27895.)

JOSEPHOLEIDYA sp.

A tooth of the same origin as that just mentioned, suggests *J. adunca*, but again proper comparison is impossible. (Cast, Amer. Mus. No. 27890.)

RICARDOLYDEKKERIA sp.

Another tooth of the same origin resembles *R. cinctula* sufficiently for reference to the same genus. It is probably a distinct species, but is inadequate for secure definition. (Cast, Amer. Mus. No. 27891.)

?LITOPTERNA indet.

Amer. Mus. No. 28572 from Cañadón Hondo is the inner half of a worn upper molar. Although it is, of course, inadequate for identification, it definitely suggests *Guilielmofloweria*, and with some probability belongs to the same general group.

Fig. 11

Fig. 12

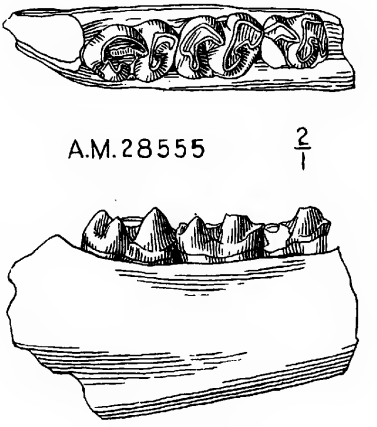

Fig. 13

Fig. 11. *Ricardolydekkeria* species. Feruglio Collection. Right upper molar. Crown view, enlarged two diameters.

Fig. 12. *?Peripantostylops orehor*, new species. Type, Amer. Mus. No. 28526. Left M^2. Crown view. Enlarged two diameters.

Fig. 13. *?Peripantostylops orehor*, new species. Paratype, Amer. Mus. No. 28555. Left lower jaw with M_{1-3}. Crown and internal views, enlarged two diameters.

NOTOUNGULATA

NOTIOPROGONIA

HENRICOSBORNIIDAE

?Peripantostylops orehor,[1] new species

TYPE.—Amer. Mus. No. 28526, part of left maxilla with M^2.

PARATYPE.—Amer. Mus. No. 28555, part of left lower jaw with M_{1-3}.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—M^2 resembling *P. minutus* in relatively strong crochet, deep valley, etc., but larger, more transverse, and crochet weakly forked at end. Paratype lower

[1] *Ore(nc)*, "white," *hor*, "tooth," Tehuelche—the comparative Casamayor specimen happening to have deeply stained teeth.

teeth also slightly larger and relatively markedly more transverse, more strongly built, internal valleys less open, more distinct internal cingulum on metaconid. Measurements as below:

M^2		M_1		M_2		M_3	
Length	Width	Length	Width	Length	Width	Length	Width
4.8	6.8	4.2	3.3	5.1	3.8	5.6	3.6

This is probably a distinct genus, but it is almost impossible to distinguish these small henricosborniids generically without much better material than is yet available.[1] The type and paratype are not associated and there is inevitably some doubt as to their really being of the same species, but the characters are so harmonious and the occlusion so perfect that their tentative union is fully warranted.

Henricosbornia waitehor,[2] new species

TYPE.—Amer. Mus. No. 28530, part of left lower jaw with M_{1-2} and part of M_3.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

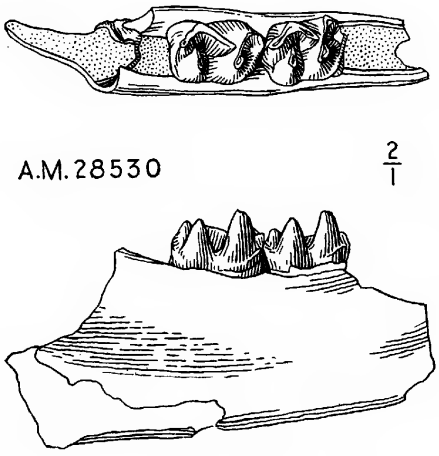

Fig. 14. *Henricosbornia waitehor*, new species. Type, Amer. Mus. No. 28530. Left lower jaw with M_{1-2}. Crown and internal views, enlarged two diameters.

DIAGNOSIS.—Closely similar to *H. lophodonta*, but lower molars narrower relative to length and metaconids slightly weaker, less produced anteriorly or anteroexternally. Measurements as follows:

M_1		M_2	
Length	Width	Length	Width
5+	3.7	5.5	3.8

[1]We have, however, good associated upper and lower dentitions of the Casamayor *Peripantostylops minutus* which place this species on a better basis than any other of the family.

[2]*Waite(nc)*, "yellow," *hor*, "tooth," Tehuelche.

It is extremely difficult to distinguish genera, and sometimes even families, in these very stereotyped lower molars of primitive notoungulates, but this is so close to *Henricosbornia lophodonta* in structure that its correct reference to this genus is highly probable.

?POSTPITHECUS sp.

A fragmentary lower jaw, with M_3, in the Feruglio Collection (Cast, Amer. Mus. No. 27888), from the upper sandstone of the Bajo de la Palagana, may belong to *Postpithecus*. The heel crest is single, without separate cusps, and there is no transverse entoconid crest. There is a small spur or accessory cuspule on the metaconid. M_3 is not surely known in *Postpithecus*, but might be like this. The size would be about right for *P. reflexus*. An M_3 referred to *P. curvicrista* by Ameghino (figured but not the type) is similar but has the heel more irregular in outline and the entoconid more separate, although not transverse. It is also smaller.

Fig. 15. *?Postpithecus* sp. Feruglio Collection. Left M_3. Crown view, enlarged two diameters.

There is an M^3 from the same place which occludes well with the M_3 discussed in the last paragraph, although good occlusion does not necessarily prove identity. The upper tooth is apparently a henricosborniid, but is not exactly like any other M^3 known to me. The lower tooth is so unusual that its reference to the henricosborniids is very dubious.[1]

?NOTOSTYLOPIDAE

Gen. et sp. indet.

Amer. Mus. No. 28556, from Cañadón Hondo, is an isolated upper molar, probably M^2, which is unlike any other known to me but is too doubtful in character to warrant more than a passing note. A little larger than *Henricosbornia lophodonta*, it differs in the flattened ectoloph posterior to the paracone fold, in the small and subordinate hypocone, and in the flattened inner wall without a definite groove between protocone and hypocone. These are all notostylopid characters. On the other hand its very small size (length 6.1, width 7.7 mm.), slight but continuous and oblique crochet basally united with the ectoloph, and relatively low crown are all unlike any known notostylopid. Comparison with *Seudenius cteronc* cannot be very detailed, but the crown is relatively a little higher and the species is considerably smaller.

[1]It is by no means certain that *Postpithecus* is correctly placed in this family.

?NOTIOPROGONIA incertae sedis

SEUDENIUS,[1] new genus

TYPE.—*Seudenius cteronc*, new species.

DISTRIBUTION.—As for the species.

DIAGNOSIS.—A primitive notoungulate with extremely low-crowned teeth. P^{3-4} very short and wide, P^3 with convex outer wall and small separate parastyle fold. Protocone of P^4 attached to protoloph but not to metaloph. Small posterointernal cingulum but no hypocone on P^4. M^1 quadrate, with fairly prominent metacone fold and slightly basined external cingulum between this and paracone fold. M^2 trapezoidal, metacone fold absent or very weak, external cingulum distinct, hypocone small and not strongly united to protocone. Valleys of P^3–M^2 not forming closed fossettes, or these obliterated immediately by wear.

There are three specimens of this peculiar genus in the collection, but all are very imperfect. They show that the genus is very distinctive and demand designation, but do not permit any close determination of affinities. There are resemblances to three different families (and suborders), but in no case is the resemblance close enough to demonstrate special relationship. There is some resemblance to the most primitive isotemnids, such as *Maxschlosseria*,[2] but the simpler premolars, very low crowns, and absence or very early obliteration of closed fossettes are distinctly non-isotemnid characters. There is also some resemblance to the larger henricosborniids, but here, too, the very simple and transverse premolars are different from any known genus, as are also the ectoloph wall of M^1 and, especially, M^2, and also the proportions of protocone to hypocone on M^2. The species is also much larger than any known henricosborniid. Finally, there is a strong suggestion of the more primitive notostylopids, especially *Homalostylops parvus*, which is of about the same size, but the crowns are still lower in *Seudenius*, P^4 is still simpler than in *Homalostylops*, the lack of a protocone-metaloph connection on the premolars is distinctive, and there are other minor differences. Presumably *Seudenius* belongs to one of these three groups, perhaps with slightly greater probability to one of the latter two, but the discovery of completely unworn molars or of the anterior dentition is necessary to determine the question.

Seudenius cteronc is of about the same size as its associate *Kibenikhoria get*, but the two cannot be confused after more than the most superficial examination.

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[1] *Seu(nc)*, "many," *den*, "brother," Tehuelche, is allusion to its puzzling resemblance to various different groups.

[2] Which, however, is aberrant and not surely isotemnid.

Seudenius cteronc,[1] new species

TYPE.—Amer. Mus. No. 28538, part of left maxilla with P^3–M^2, somewhat broken.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—Sole known species of the genus. P^3 length 3.9 mm.; M^2 length 7.2, width 9.1 mm.

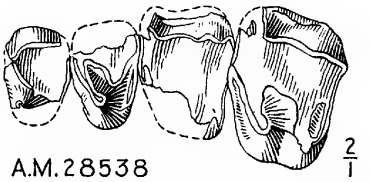

Fig. 16

Fig. 16. *Seudenius cteronc*, new genus and species. Type, Amer. Mus. No. 28538. Left P^3–M^2. Crown view enlarged two diameters.

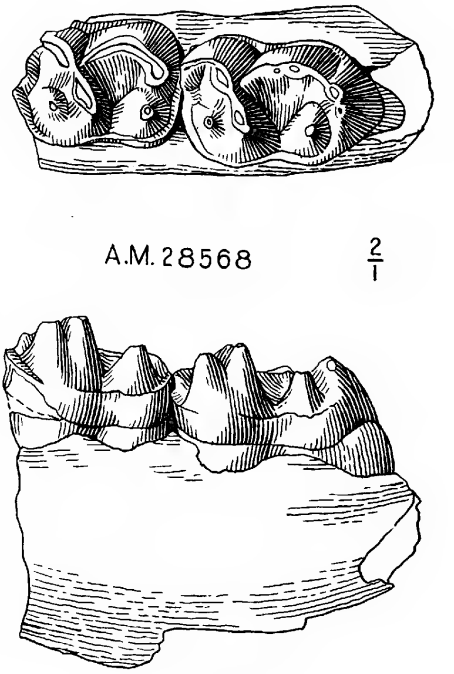

Fig. 17

Fig. 17. *?Isotemnus ctalego*, new species. Type, Amer. Mus. No. 28568. Part of right lower jaw with M^{2-3}. Crown and internal views, enlarged two diameters.

ENTELONYCHIA

ISOTEMNIDAE

?Isotemnus ctalego,[2] new species

TYPE.—Amer. Mus. No. 28568, part of right lower jaw with M_{1-4}.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—Lower molars very low-crowned, small, and primitive. Entoconid nearly conical, transverse cresting very slight. Faint external and internal cingula. Hypoconulids slightly distinct in talonid crescent. M_2 length 10+, width 7.7; M_3 length 12.4, width 7.7 mm.

This species belongs, by definition, to Ameghino's "*Eochalicotherium*," which is almost surely the lower dentition of *Isotemnus*. The

[1] *Cteronc*, "bad," Tehuelche.
[2] *Ctale(nc)*, "little," *go*, "brother," Tehuelche.

species is, on the whole, the most primitive known. "*Trimerostephanus*" *colhuehuapiensis* is of about the same size, but the molars are narrower; the only known specimen is so poorly preserved that the structural details cannot be made out. "*Eochalicotherium*" *minutum* is smaller and still more primitive, but it certainly does not belong in this generic group and probably not in this family.

Amer. Mus. No. 28576, also from Cañadón Hondo, is a fragment of upper jaw with parts of P^4 and M^1. It also is a very primitive isotemnid, suggesting *Isotemnus enecatus* but still smaller, about the size of *I. apicatus*, with which, however, detailed structural comparison cannot be made on the basis of the known material. Amer. Mus. No. 28576 may represent the upper dentition of *?Isotemnus ctalego*, and tends to confirm, although it does not prove, reference to this genus.

ISOTEMNIDAE indet.

The presence of other isotemnids at Cañadón Hondo is revealed by a worn lower molar 10.3 mm. in length and by about half of an M^3 of a larger animal. Both are low crowned and suggest very primitive members of this family.

TYPOTHERIA

NOTOPITHECIDAE

?TRANSPITHECUS sp.

Amer. Mus. No. 28578, from Cañadón Hondo, is a maxillary fragment with M^1 and half of M^2 which suggests *Transpithecus* but is inadequate for certain identification.

Gen. et sp. indet.

An isolated upper tooth and several lower teeth and jaw fragments suggest that one or two other notopithecids were present at Cañadón Hondo, but none can now be identified even as to genus.

ACOELODIDAE

KIBENIKHORIA,[1] new genus

TYPE.—*Kibenikhoria get*, new species.

DISTRIBUTION.—As for species.

DIAGNOSIS.—A probable acoelodid close to *Ultrapithecus* but with P^1 two-rooted and longer than wide, P^2 simpler than P^{3-4} and not developing a closed fossette except possibly a very small one in the last stages of wear, P^{1-3} generally less transverse, external metacone fold present on molars and only slightly less prominent than para-

[1] *Kibenik* (*c'benic*), "high," *hor*, "tooth," Tehuelche.

cone fold, a sharp pocket developed in the ectoloph between these, and hypocone equal to or smaller than protocone and not projecting so far internally as in *Ultrapithecus*. Agrees with *Ultrapithecus* and differs from *Oldfieldthomasia* in absence of metacone fold on premolars and of mesostyle on molars. Crown relatively high for this fauna.

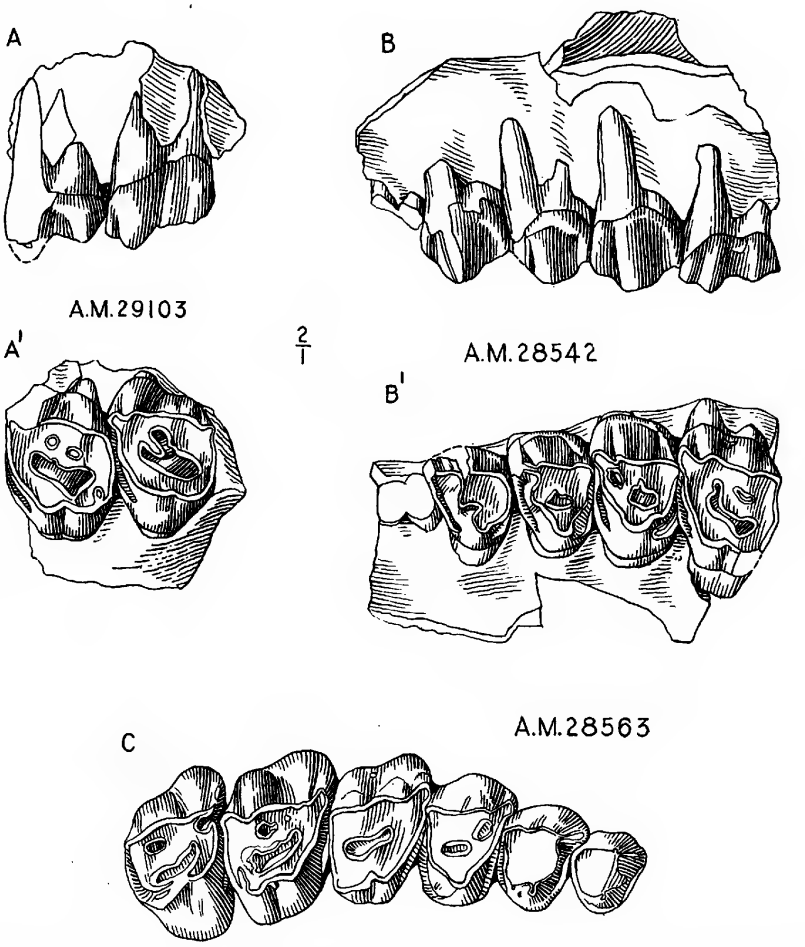

Fig. 18. *Kibenikhoria get*, new genus and species. A, A^1, referred specimens, Amer. Mus. No. 29103, left M^{2-3}. B, B^1, type, Amer. Mus. No. 28542, left P^2–M^1. C, paratype, Amer. Mus. No. 28563, P^2–M^3. Crown (A^1, B^1, C) and external (A, B) views, all enlarged two diameters.

This genus also resembles the probably isotemnid *Maxschlosseria*, especially *M. emundata* (*Isotemnus emundatus* Ameghino), but is probably less closely related to it than to *Ultrapithecus*. The molar metacone fold is much more prominent, the crowns are higher, the enamel invagina-

tions seem to be somewhat different, and there are other apparent differences difficult to confirm because of the poor material of *Maxschlosseria.*

Isolated lower teeth or jaw fragments with two or three teeth which are almost surely of *Kibenikhoria* also occur in the collection. They seem to be highly variable, but this is probably due to the different wear stages and to the fact that most of them are broken or crushed. As in the upper teeth, the crowns are higher than in other members of this fauna. The hypoconulid is small and appears as a small spur. The

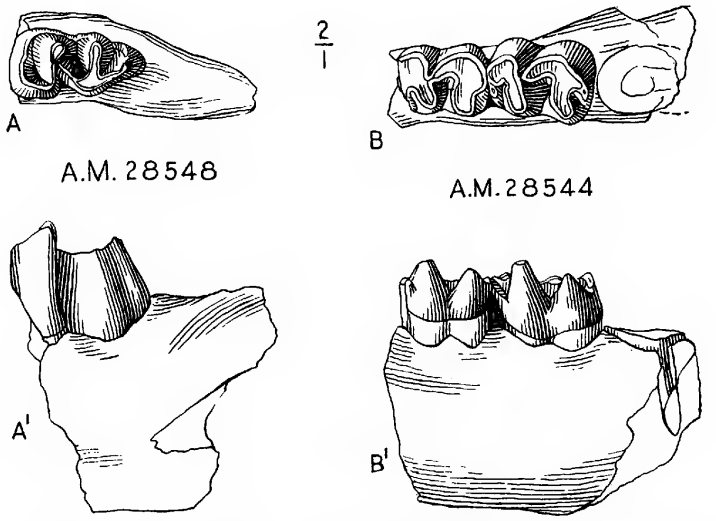

Fig. 19. *Kibenikhoria get*, new genus and species. Referred specimens. A, A^1, Amer. Mus. No. 28548, left M_3. B, B^1, Amer. Mus. No. 28544, right M_{1-2}. Crown (A, B), external (A^1) and internal (B^1) views, all enlarged two diameters.

entoconid forms a large and plump transverse crest and the valley between this and the expanded metaconid is deep and narrow. The hypoconid crescent abuts against the middle of the protolophid, from which its apex is free although the bases are completely fused. The metaconid is simple even when only slightly worn.

There are also several symphyses, without tooth crowns, in the collection, such as Amer. Mus. No. 28552, which probably belong to this genus, judging from their abundance, size, and general character. They are long and slender, I_1 to C all strongly procumbent and arranged in a narrow parabola, the roots increasing constantly in size from I_1 to C.

Kibenikhoria get,[1] new species

TYPE.—Amer. Mus. No. 28542, part of left maxilla with P^2–M^1 and roots of P^1.

PARATYPE.—Amer. Mus. No. 28563, part of right maxilla with P^2–M^3, worn and in part corroded.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—Sole known species of genus. Measurements of type as follows:

P^2		P^3		P^4		M^1	
Length	Width	Length	Width	Length	Width	Length	Width
5.2	6.3	...	7.1	5.5	8.3	6.3	8.3

This is far the most common species in the collection, about half the identifiable specimens belonging to it. Among the lower jaw fragments referred are Amer. Mus. No. 28544, with right M_{1-2}, referred with almost complete assurance, and Amer. Mus. Nos. 28548 and 28543, each with a left M_3, referred with some doubt. The last mentioned specimen has a conical cuspule between the entoconid and metaconid which is probably adventitious as it does not appear on other last lower molars otherwise identical.

?TRIGONOSTYLOPOIDEA

SHECENIA,[2] new genus

TYPE.—*Shecenia ctirneru*, new species.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—Symphysis very long, fused, channeled above, lower surface plane transversely and gently curved longitudinally, meeting the lateral surfaces at a sharp angle. Median teeth small, followed by an also median but more posterior, larger pair. Lateral to these two pairs of teeth is a greatly enlarged, long-rooted, strongly curved, procumbent pair. These are followed by a long, crested diastema, and then (at about the middle of the symphysis) by a somewhat smaller, short-rooted, semi-procumbent pair of teeth.

This cannot be an animal represented by cheek teeth from this locality, for the only cheek teeth of comparable size are fairly orthodox isotemnids that could never have had such a symphysis.

The only genus with which comparison is possible is *Trigonostylops*. They agree in the long, fused symphysis, the presence of two pairs of small incisors enclosed by a pair of greatly enlarged, curving, procumbent teeth posterior to which is a diastema, and (in some species of *Trigonostylops*) the presence of a tooth in the middle of this diastema and (longitudinally) of the symphysis. A tentative suggestion of relation-

[1] *Get*, "fine, nice," Tehuelche.
[2] *Shecen*, "chin," Tehuelche, the type being a mandibular symphysis.

ship is warranted. But the peculiar flattening of the lower surface of the symphysis in *Shecenia* is not seen in *Trigonostylops*, and the tooth ($P_{?1}$) in the diastema of *Shecenia* is large and semi-procumbent while in *Trigonostylops*, if present at all, it is small and vertical. *Shecenia ctirneru* is much smaller than any known species of *Trigonostylops*.

Shecenia ctirneru,[1] new species

TYPE.—Amer. Mus. No. 28531, mandibular symphysis with various alveoli and roots or worn bases of one pair of teeth.

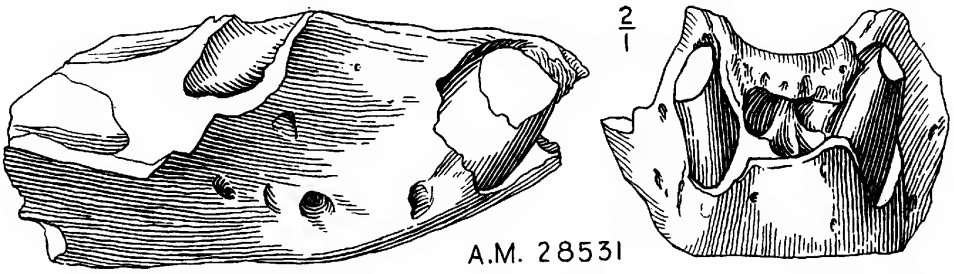

Fig. 20. *Shecenia ctirneru*, new genus and species. Type, Amer. Mus. No. 28531. Mandibular symphysis. Right lateral and anterior views, enlarged two diameters.

HORIZON AND LOCALITY.—Río Chico Formation, Cañadón Hondo, Chubut, Argentina.

DIAGNOSIS.—Sole known species of genus. Width of flat lower surface of symphysis 13.5 mm. Length of anterior diastema 10 mm. Maximum diameter of bases of largest pair of teeth 6.2 mm.

Incertae Sedis

CARODNIA,[2] new genus

TYPE.—*Carodnia feruglioi*, new species.

DISTRIBUTION.—As for the species.

DIAGNOSIS.—M_3 with trigonid bearing a very strong transverse crest, concave anteriorly, rising to a cusp at each end. Crenulated crest curving from protoconid around anteroexternal border and ending at midline, but no distinct paraconid. Talonid lower, simple, without closed basin, slightly narrower and longer than trigonid but not prolonged into a third lobe. Hypoconid separate, nearly conical but prolonged transversely to join a low vague longitudinal crest slightly external to the midline. This vague crest ends posteriorly in an elevated cusp, presumably the hypoconulid, nearly as high as the metaconid but smaller, which is likewise the starting point of a high, sharp, crenulated crest around the posterointernal border of the tooth, ending abruptly and leaving a large, open notch between it and the metaconid.

[1] *Ctirne*, "long," *eru*, "head," Tehuelche.
[2] *Carodn*, "thunder," Tehuelche. This is much the largest animal known from the Río Chico Formation.

Entoconid not represented except as a slightly more prominent eminence near the anterior end of this crest.

The shearing trigonid crest (worn on its posterior edge) resembles that of *Carolozittelia* almost to the point of identity, but the talonid is so different that it is hard to believe in any close relationship. In M_3 of *Carolozittelia* there is a transverse talonid crest very similar to that of the trigonid but slightly smaller, followed by a small third lobe.

Trigonostylops also has a transversely crested trigonid, but it retains a short, but more distinct, anterior wing of the primitive trigonid crescent, and the heel of M_3 is very different. *Griphodon* likewise has a similar trigonid. Its M_3 is unknown, but it is probably a pyrothere and its wide geographic separation and probably different age (as well as the considerably larger size of the known species) do not permit the assumption of any intimate relationship.

Carodnia resembles the primitive uintathere *Probathyopsis* more closely than any other animal known to me. The trigonid crests are almost identical in structure, and, still more important since here the resemblance to South American groups ceases, the talonid is also basically similar. The hypoconid occupies the same position in both and is similarly isolated except for feeble transverse extension and connection with an imperfect longitudinal eminence. A similar papillated crest runs between hypoconulid and hypoconid in both. The differences are that in *Probathyopsis* the weak anterior crest from the inner side of the hypoconid runs obliquely to the base of the metaconid rather than more longitudinally to near the middle of the base of the protoconid-metaconid crest, that the entoconid is more distinct, the crest from the hypoconulid becoming low against the entoconid base, and that the talonid is longer, the hypoconulid projecting more posteriorly. *Carodnia feruglioi* is larger than *Probathyopsis praecursor*.

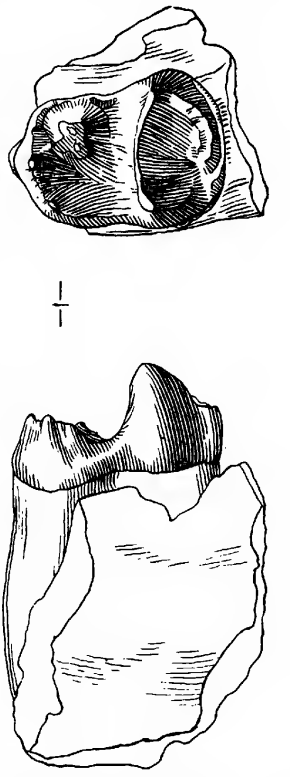

Fig. 21. *Carodnia feruglioi*, new genus and species. Type, Feruglio Collection. Left M_3. Crown and internal views, natural size.

M_3 of *Carodnia* is closer morphologically to that of *Probathyopsis* than to any other known form, and it is quite possible that a real rela-

tionship exists but the inadequate material and the existence of some distinct and possibly important differences do not permit any positive conclusion.

Carodnia feruglioi,[1] new species

TYPE.—In Feruglio Collection, left M_3. Cast, Amer. Mus. No. 27886.

HORIZON AND LOCALITY.—Lower Río Chico Formation, Bajo de la Palangana, Chubut, Argentina.

DIAGNOSIS.—Sole known species of genus. M_3 length 24.3 mm., width of trigonid 17.5 mm., width of talonid 15.5 mm.

CTALECARODNIA,[2] new genus

TYPE.—*Ctalecarodnia cabrerai*, new species.

DISTRIBUTION.—As for the species.

DIAGNOSIS.—Lower molars consisting of two slightly oblique transverse crests, each elevated into a cusp at each end and somewhat concave on anterior side, an open transverse valley between the crests, the posterior crest slightly smaller, and followed by a median posterior cingulum, about half as wide as the main crests, which forms a much smaller basal crest. Probable P_4 with talonid crest relatively smaller and trigonid quadrate, a ridge running downward and forward from each terminal cusp, that from the metaconid more vague and ending before reaching the anterior margin, that from the protoconid turning at right angles at the anteroexternal corner, continuing as a sharp, low, horizontal ridge along the anterior border, and terminating abruptly near the anterointernal corner.

This animal is represented by a number of tooth fragments, principally the posterior parts of two molars and most of a probable posterior premolar. It is not absolutely certain that these are of one individual, but the probability is so great as to warrant that assumption. They are of appropriate size and structure to belong together and were found at the same horizon and locality in a formation otherwise almost without fossils. They are much too small to belong to *Carodnia feruglioi*. While direct comparison with *Carodnia* is impossible, it is hardly conceivable that two animals so different in size and living in the same area at the same time belong to the same genus, and it also seems highly unlikely that *Carodnia* had M_1 or M_2 similar to those of *Ctalecarodnia*.

The molars of *Ctalecarodnia* do not resemble those of *Probathyopsis*, the talonids, especially, being too different to warrant any idea of special relationship. If *Ctalecarodnia* is related to *Carodnia* (which is quite undemonstrated but conceivable), then *Carodnia* is probably not related to *Probathyopsis*, but such highly hypothetical considerations have little value. *Ctalecarodnia* is also very unlike *Trigonostylops* in talonid

[1]Dr. Egidio Feruglio, who found the specimen and who has done so much excellent work in Patagonia.

[2]*Ctale(nc)*, "small," Tehuelche, +*Carodnia*.

structure. In spite of its very much smaller size, it is closely similar to the same parts of *Carolozittelia* (in which, however, no premolar is known, and the usually distinctive M_3 cannot be compared because unknown in

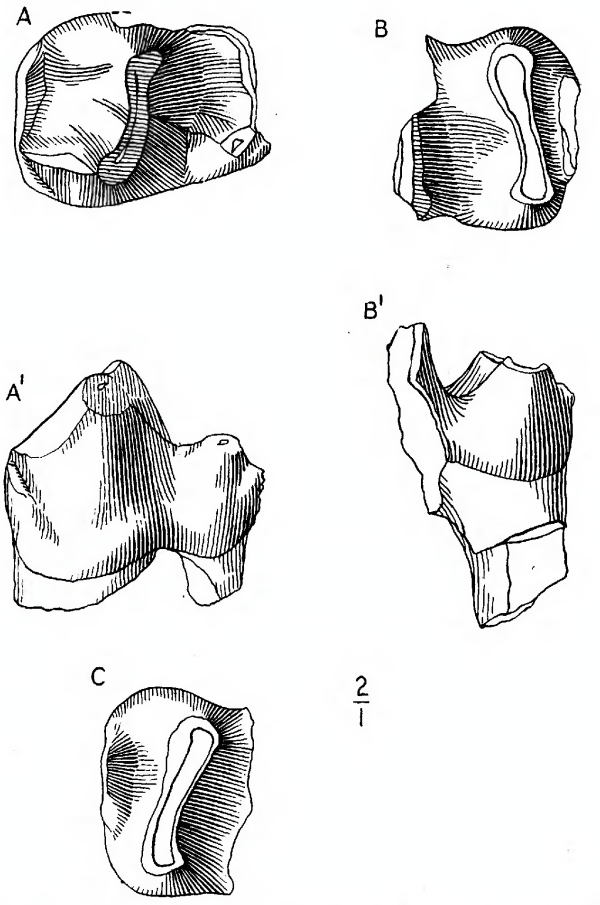

Fig. 22. *Ctalecarodnia cabrerai*, new genus and species. Type, Feruglio Collection. A, A^1, left $?P_4$. B, B^1, talonid and part of trigonid of right lower molar. C, talonid of left lower molar. Crown (A, B, C), external (A^1), and internal (B^1) views, enlarged two diameters.

Ctalecarodnia). To a less extent it is also like *Griphodon* in the molars, but the presumable premolar is very unlike either P_3 or P_4 of *Griphodon*. There is resemblance in varying degree to many lophiodont groups, tapirs, kangaroos, sirenians, and so on, but there is no reason to assume the possibility of relationship with any of these on present evidence.

Ctalecarodnia cabrerai,[1] new species

TYPE.—In Feruglio Collection, several probably associated tooth fragments. If it should prove that the association is not natural, the probable posterior premolar is to be taken as the type. Casts, Amer. Mus. No. 27897.

HORIZON AND LOCALITY.—Lower Río Chico Formation, Bajo de la Palangana, Chubut, Argentina.

DIAGNOSIS.—Sole known species of genus. Talonid widths of two more complete molar fragments 11.4 and 11.7 mm. Trigonid width of $?P_4$ about 12.2 mm.

Gen. et sp. indet.

At the same horizon and locality as the type of *Carodnia feruglioi* an incisor was found (Fig. 23) which may belong to that species (cast, Amer. Mus. No. 27894). Near this site and about one meter higher was

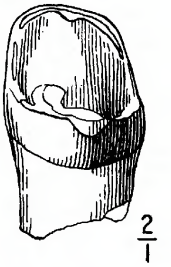

Fig. 23

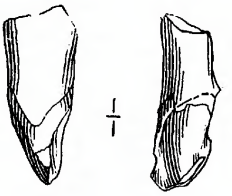

Fig. 24

Fig. 23. Incisor found with type of *Carodnia feruglioi*. Feruglio Collection. Lingual view, enlarged two diameters.

Fig. 24. Incisor found near to but about one meter higher than type of *Carodnia feruglioi*. Feruglio Collection. Lingual and lateral views, natural size.

found another, somewhat similar but apparently not homologous incisor (Fig. 24. Cast, Amer. Mus. No. 27889), a small incisor or canine surely not of *Carodnia*, and a molar fragment of size appropriate to belong to *Carodnia*, although there is no basis for assumption that it is in fact that genus. (Cast, Amer. Mus. No. 27887.) This is part of a transverse talonid crest followed by a posterior cingulum. It is, of course, too fragmentary to draw any useful conclusion, but the fragment is closely similar to the corresponding part of *Carolozittelia tapiroides*. As already shown, *Carodnia* is certainly not very close to *Carolozittelia*, although some degree of relationship is not wholly excluded.

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